

The Builder.

SATURDAY, OCTOBER 16, 1852.

AT the present moment the proper size of drains is being discussed as vigorously and as widely as if nothing were known about it: the experiments and evidence on record are ignored, and there seems a disposition to fall back into the old ways even amongst the Metropolitan Sewers Commissioners. It is to be hoped they will first reflect on what they are about to do. We have received, as we said last week, a number of communications on the subject, but can find room only for one at this moment, which steers midway between two conflicting opinions, and will stand for something of what we are about to write.*

"With reference to the shower of letters on the subject of pipe-drainage," says the writer, himself an engineer, "pray let it be remembered that partial failure is incidental to all the works of man. Have there not been failures in brick sewers, in stone culverts, in bridges, in viaducts, in churches, and in houses? Do not steam-engines blow up, and carriages break down? In fact, is there not partial failure even in the operations of nature? if such a complexion may be put upon breakings, burstings, and crumbings.

That small pipes have failed, in many instances, is a fact too notorious to be denied. Have not the small pipe drains which were laid down at Whitehall by the Commissioners of Sewers, right in the way, and in the sight of the General Board of Health, failed? Yea, more than once to my certain knowledge; and I have been told of numerous failures in other places, within the jurisdiction of the Commissioners in Greek-street; and I think it is highly probable we shall hear of other failures from the same quarter. Before, however small pipes are denounced, these failures should be investigated; and the extent of success should be weighed against the extent of failure. There have been some thousand miles of small pipe sewers laid within the last seven years (upwards of 260 miles in the metropolis), under all sorts of conditions, and there has been bad material, with worse workmanship. Miles of pipes have been used without fall, and refuse of all sorts is crammed into them without care. There are, therefore, partial failures. Small pipes have been crushed, so have brick sewers; small pipes have been choked, so have large sewers. Small pipes have been laid too small, brick sewers have been laid too large. Let us have a fair balance struck."

Some of the statements which have been made by the opponents of the new system are

* One of the objectors, a medical man, says,—"In my professional duties, among other matters, nothing has appeared to me more important than the perfect drainage of every dwelling-house, particularly in large and crowded towns. The mode of drainage seems yet open to much practical improvement. Pipe drainage in itself is, perhaps, one of the best of recent date; but I consider it has two evils, as now practised: the first, but least, because easily remedied, is the difficulty of opening any part of the course of piping without breaking up and disturbing a considerable portion; this, however, is got over by the use of the half-flange or 'tee' joint. The second evil (the Alpha, and Omega of this letter) is of the greatest magnitude, viz. the pipes being too small. They tell us, that while a pipe of one inch in diameter is quite adequate to supply a moderate-sized house with water, one four inches in diameter will amply suffice to drain it; but such is not the fact, as the very discussion at the Sewers' Board plainly shows. They compel builders and persons draining their houses to adhere to certain rules laid down, and furnish them with a piece of heading of a size by which numbers of people are able to prove their houses will not drain properly. In rain it is the sanitary Commissioners, to urge the use of drainage, while other commissioners compel the public to adopt so important and dangerous a method. I am aware that many persons contend and believe that small pipes are as useful and efficient as the larger ones; but such as found not to be so in practice. They talk of the force of the current being greater in the smaller pipes, &c.; but as the refuse of all kinds thrown down the drains is only held in suspension, and as each portion is poured down separately, it lingers along in a very small and feeble stream, getting weaker and weaker, till it dribbles away into the main sewer, and thus much of the refuse is deposited along the sides of the drain, which, of course, becomes quickly obstructed if but of small size."

mendacious in the extreme; thus, for example, Cardiff has been placarded, since the determination to adopt pipe-drainage there, summoning the rate-payers to a public meeting, "to consider what steps shall be taken to prevent the carrying out the ruinously expensive system of pipe-drainage, which has been proved, beyond doubt, to be a failure wherever the experiment has been tried."

Now, the fact is, no such proof whatever has yet been given in any one place. We do not abandon a useful apparatus because it is put out of order once or twice by improper treatment or through want of knowledge, but first strive to remove the impediments to its successful working. If people will throw bricks, brooms, and babies into a 4-inch pipe, of course the drainage will be stopped; but surely this is not sufficient reason, supposing the great advantages of small drains in other respects, and their complete efficiency when properly used satisfactorily proved, for abandoning the pipe drain which would take away the refuse at once and while innocent, and substituting a monstrous brick receptacle, wherein it may decompose lie, develop its incipient evil, and distil off its murderous gases.

We have yet to learn the actual facts of what is called the failure in Church-lane, St. Giles's, and which may be so for anything we know to the contrary. That the work was badly done, that some of the houses are occupied by large numbers of tramps and others wholly ignorant of proprieties, and that the drains of many of the houses have been stopped, we have every reason to believe, but if on no other grounds than these the Sewers' Commissioners abandon the pipe drain and go back to the brick receptacle,—prefer "stagnation" to "circulation," as it was forcibly expressed at the Belgic Congress the other day, they will incur a reproach which will grow heavier with the increase of knowledge on the subject.

DIAMETER OF PIPES AND SEWERS IN INCHES

	24	30	36	42	48	72	48	96	120	144	168	192
Level	34	67	130	277	571	1089	1725	2581	4126	5425	7480	10,100
1 inch in 10 feet, or 1 in 90	43	85	135	304	630	1117	1725	2581	4126	5425	7480	10,100
1 inch in 10 feet, or 1 in 80	40	80	125	285	595	1089	1725	2581	4126	5425	7480	10,100
1 inch in 10 feet, or 1 in 70	37	73	115	265	555	1049	1681	2501	4001	5251	7251	9851
1 inch in 10 feet, or 1 in 60	34	68	105	245	515	1009	1641	2451	3951	5151	7051	9551
1 inch in 10 feet, or 1 in 50	31	62	95	225	475	969	1581	2351	3851	5051	6951	9351
2 inches in 10 feet, or 1 in 40	115	135	315	730	1500	2675	4350	7125				

The second shows the "size and inclination of main house drains for given surfaces, and the number of houses of either rate thereon." In this it is shown, according to Mr. Roe, that nine fourth-rate houses may be drained by a 3-inch pipe, if with a fall of 1 in 20; and ten first-rate houses by a 5-inch pipe, with the same fall! We do not suppose the Board intend to recommend the adoption of these sizes in such cases; at all events we do not.

From these tables the Board deduces "that the sewer formerly proposed as the smallest size admissible for the drainage of a 'mansion,' viz. 15 inches, would, at a fall of 1 in 120, drain 179 of the largest mansions, or 254 of the smallest houses; that a 9-inch drain (the minimum size prescribed by the Building Act, for the drainage of a single house), would, at the same gradient, remove the storm-water from twenty-one of the largest mansions, or from seventy-six of the smallest houses; or, at a fall of 1 in 60, would drain nearly 100 of the smallest, or an area of nearly 2½ acres of covered surface. An 18-inch sewer, less than that prescribed as the minimum size into which

We are not by any means pledged to the approval of pipes of the minimum size prescribed by theory, knowing the casualties to which ignorance subjects them, and the inconvenience that failure causes. Our hesitation, however, lasts no longer than would admit of the confirmation of theory by practice, and the devising of such means as might prevent the recurrence of stoppages by misuse. It has happened to us, in private practice, to lay down several miles of pipe-sewers and drains, of smaller size, under the orders of the then Commissioners, than seemed to us at the time, and in the place, expedient. But our fears, not that the drains were insufficient for their legitimate purpose, but that they would fail under accidents to which they were liable, have proved needless. Up to this time we are not aware of any inefficiency. The cost under the old system, and this is an important point to bear in mind, would probably have delayed the drainage of the neighbourhoods to which we are alluding several years.

The evidence on record, unless the most extraordinary fabrication ever known, is so conclusive against the old system of sewerage that it seems childish again to discuss it. And there are experiments as to the run of water through pipes, which cannot be talked away. The new "Minutes of Information collected with Reference to Works for Drainage," to which we have previously alluded, contain some important tables prepared by Mr. Roe, which show how erroneous were the formulae hitherto used—erroneous through not being founded on the right conditions. The first table shows the quantity of covered surface from which circular sewers (with junctions properly connected) will convey away the water coming from a fall of rain of 1 inch in the hour with house drainage, as ascertained in the Highborn and Finsbury divisions. It is so curious in its results that we give it in full:—

a man might crawl for cleaning, would, at an inclination of 1 in 80, remove the storm-water from nearly twenty acres; and a sewer of 3 feet (less than the minimum size formerly recommended for the smallest street) would, at the same inclination, remove the drainage from 295 acres.

The report points out, as a "hydraulic paradox" (the knowledge of which is very important, by the way), the fact that a uniform, sufficiently sloping, open channel, which at its top is freely receiving from a reservoir, or a meeting of currents, so much water as completely to fill its mouth, can yet receive into its stream lower down, large additional quantities of water through lateral inlets, and will then discharge from its bottom opening, which is of the same size as the top opening, even several times as much water as entered at the top. Another of these "paradoxes" is the fact, that if a common funnel, or a short piece of tube with a gaping mouth, be held under a water-cock, and as much water be allowed to fall into it as to maintain it nearly full, and if then a pipe of the same diameter as the lower